REMARKS

The Office Action mailed June 7, 2002, has been reviewed and the comments of the Patent and Trademark Office have been considered. Claim 4 has been cancelled without prejudice or disclaimer. Claims 1, 18, 28-30 and 33-35 have been amended. Claims 7-10 and 12-14 have been withdrawn from further consideration. Of the claims not withdrawn from further consideration, claims 1-2, 5-6 and 15-36 are pending for reconsideration.

Objections to the claims

Claims 33 and 34 were objected to for informalities. Applicants have amended claims 33 and 34 as suggested by the Examiner. Accordingly, applicants submit that the objections to claims 33 and 34 have been overcome, and respectfully request that the objections be withdrawn.

Allowable subject matter

Applicants appreciate the indication that claims 19-22 are allowed and that claim 34 would be allowable if rewritten in independent form. Applicants have not amended claim 34 at this time, because for the reasons given below, applicants believe that independent claim 33, from which claim 34 depends, is allowable.

Rejections under 35 U.S.C. §§ 102 and 103

Claims 1-2 and 26-32 stand rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,412,946 to Oshima et al. (hereafter "Oshima"). Claims 4, 18, and 23 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Ohshima in view of U.S. Patent No. 6,244,044 to Bartley (hereafter "Bartley"). Claims 5 and 15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Ohshima in view of Bartley and U.S. Patent No. 6,151,547 to Kumar et al. (hereafter "Kumar"). Claim 16 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Ohshima in view of Bartley and Kumar and further in view of design choice. Claims 6 and 17 stand rejected under 35 U.S.C. 103(a) as

being unpatentable over Ohshima in view of U.S. Patent No. 5,124,303 to Kobayashi et al. (hereafter "Kobayashi") and U.S. Patent No. 4,149,998 to Tauster et al. (hereafter "Tauster"). Claims 24 and 25 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Ohshima in view of U.S. Patent No. 6,173,571 to Kaneko et al. (hereafter "Kaneko"). Claims 33, 35 and 36 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Ohshima in view of U.S. Patent No. 5,297,515 to Gale et al. (hereafter "Gale"). Applicants respectfully traverse these rejections, insofar as they pertain to the claims as presently amended, for the following reasons.

Independent claim 1 has been amended to include the limitations from original claim 4, now cancelled. Independent claims 28, 29, 30, 33 and 35 contain limitations corresponding to the limitation added to claim 1 from original claim 4. Claim 4 was rejected based in part on Bartley. For the reasons discussed below, applicants believe that Bartley is not prior art to the invention of claim 4, or to amended independent claims 1, 28, 29, 30, 33 and 35, which now include the limitations of claim 4. Thus, all of independent claims 1, 28, 29, 30, 33 and 35 are now allowable over the references cited in the rejections, which rely upon Bartley for disclosing the limitations of claim 4.

Applicants believe that Bartley is not prior art to the present application. Applicants submit herewith a Request for Suspension of Action under 37 C.F.R. § 1.103(c) for three months to allow applicants time to gather evidence and to prepare and submit a Declaration under 37 C.F.R. § 1.131 establishing prior invention by applicants. Applicants believe that Bartley is not prior art to the present application, and the rejections based at least in part on Bartley must fail. The dependent claims that were rejected depend from one of the independent claims, and are thus likewise allowable for at least the same reasons. Accordingly, applicants respectfully request that the rejections under 35 U.S.C. 102 and 103 be withdrawn after consideration of the Declaration that the applicants proposes to file.

CONCLUSION

In view of the foregoing amendments and remarks, applicants respectfully submit that all of the pending claims are now in condition for allowance. An early notice to this effect is earnestly solicited. If there are any questions regarding the application, the Examiner is invited to contact the undersigned at the number below.

Respectfully submitted,

Date March 6, 2003

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Should additional fees be necessary in connection with the filing of this paper, or if a petition for extension of time is required for timely acceptance of same, the Commissioner is hereby authorized to charge Deposit Account No. 19-0741 for any

Versions with Markings to Show Changes Made

In the Claims:

Please amend claims 1, 18, 28-30 and 33-35 as follows:

1. (Twice Amended) An exhaust gas purifying system comprising:

a NOx treating catalyst for reducing NOx disposed in an exhaust gas passageway of a combustion device, to reduce NOx in presence of reducing components in exhaust gas; and

a hydrogen enriching device disposed upstream of said NOx treating catalyst with respect to flow of exhaust gas from the combustion device and arranged to increase a ratio of hydrogen to total reducing components in at least one of combustion gas and exhaust gas so as to meet relations represented by following formulae (1) and (2), when reduction of NOx is carried out by said NOx treating catalyst:

$$[H2 / TR]d > [H2 / TR]u \quad ...(1)$$

$$[H2 / TR]d \geq 0.3 \quad ...(2)$$

where [H2 / TR]u is a ratio between a concentration [H2]u of hydrogen and a concentration [TR]u of total reducing components in at least one of exhaust gas in the exhaust gas passageway upstream of said hydrogen enriching device and combustion gas in a state before undergoing the hydrogen ratio increasing by said hydrogen enriching device; and [H2 / TR]d is a ratio between a concentration [H2]d of hydrogen and a concentration [TR]d of total reducing components in exhaust gas in the exhaust gas passageway upstream of the NOx treating catalyst and downstream of said hydrogen enriching device,

wherein said hydrogen enriching device is at least one selected from the group consisting of a device for producing hydrogen in at least one of combustion gas and exhaust gas, a device for decreasing the reducing components other than hydrogen in at least one of combustion gas and exhaust gas, and a device for suppressing consumption of hydrogen in at least one of combustion gas and exhaust gas, wherein the device for producing hydrogen

in at least one of combustion gas and exhaust gas includes at least one selected from the group consisting of a hydrogen producing catalyst containing at least one noble metal, and a combustion control device for controlling at least one selected from the group consisting of operating parameters of an internal combustion engine and combinations of the operating parameters, the operating parameters including fuel injection timing, spark timing, opening and closing timings of intake and exhaust valves of the internal combustion engine.

18. (Once Amended) An exhaust gas purifying system as claimed in claim [4] 1, wherein the hydrogen producing catalyst has a function to produce hydrogen from HC and CO in at least one of combustion gas and exhaust gas.

28. (Twice Amended) An exhaust gas purifying system comprising:

a NOx treating catalyst for reducing NOx disposed in an exhaust gas passageway of a combustion device, to reduce NOx in presence of reducing components in exhaust gas; and

means for enriching hydrogen disposed upstream of said NOx treating catalyst with respect to flow of exhaust gas from the combustion device, said hydrogen enriching means is for increasing a ratio of hydrogen to total reducing components in at least one of combustion gas and exhaust gas so as to meet relations represented by the following formulae (1) and (2), when reduction of NOx is carried out by said NOx treating catalyst:

$$[H2/TR]d > [H2/TR]u \ldots (1)$$

$$[H2 / TR]d \geq 0.3 \ldots (2)$$

where [H2 / TR]u is a ratio between a concentration [H2]u of hydrogen and a concentration [TR]u of total reducing components in at least one of exhaust gas in the exhaust gas passageway upstream of said hydrogen enriching device and combustion gas in a state before undergoing the hydrogen ratio increasing by said hydrogen enriching means; and [H2 / TR]d is a ratio between a concentration [H2]d of hydrogen and a concentration [TR]d

of total reducing components in exhaust gas in the exhaust gas passageway upstream of the NOx treating catalyst and downstream of said hydrogen enriching means,
wherein said means for enriching hydrogen is at least one selected from the group consisting of a means for producing hydrogen in at least one of combustion gas and exhaust gas, a means for decreasing the reducing components other than hydrogen in at least one of combustion gas and exhaust gas, and a means for suppressing consumption of hydrogen in at least one of combustion gas and exhaust gas, wherein the means for producing hydrogen in at least one of combustion gas and exhaust gas includes at least one selected from the group consisting of a hydrogen producing catalyst containing at least one noble metal, and a combustion control device for controlling at least one selected from the group consisting of operating parameters of an internal combustion engine and combinations of the operating parameters, the operating parameters including fuel injection timing, spark timing, opening and closing timings of intake and exhaust valves of the internal combustion engine.

29. (Twice Amended) A method of purifying exhaust gas from a combustion device provided with an exhaust gas purifying system including a NOx treating catalyst disposed in an exhaust gas passageway of the combustion device, a NOx treating catalyst reducing NOx in presence of reducing components in exhaust gas, said method comprising:

increasing a ratio of hydrogen to total reducing components in at least one of combustion gas and exhaust gas to be supplied to the NOx treating catalyst so as to meet relations represented by the following formulae (1) and (2), when reduction of NOx is carried out by said NOx treating catalyst:

$$[H2 / TR]d > [H2 / TR]u \ldots (1)$$

$$[H2 / TR]d \geq 0.3 \ldots (2)$$

where [H2 / TR]u is a ratio between a concentration [H2]u of hydrogen and a concentration [TR]u of total reducing components in at least one of exhaust gas in the exhaust gas passageway upstream of said hydrogen enriching and combustion gas in a state before undergoing the hydrogen ratio increasing; and [H2 / TR]d is a ratio between a

concentration [H2]d of hydrogen and a concentration [TR]d of total reducing components in exhaust gas in the exhaust gas passageway upstream of the NOx treating catalyst and in a state after undergoing the hydrogen ratio increasing,

wherein said ratio of hydrogen to total reducing components is increased by at least one selected from the group consisting of producing hydrogen in at least one of combustion gas and exhaust gas, decreasing the reducing components other than hydrogen in at least one of combustion gas and exhaust gas, and suppressing consumption of hydrogen in at least one of combustion gas and exhaust gas, wherein producing hydrogen in at least one of combustion gas and exhaust gas is produced by a device including at least one selected from the group consisting of a hydrogen producing catalyst containing at least one noble metal, and a combustion control device for controlling at least one selected from the group consisting of operating parameters of an internal combustion engine and combinations of the operating parameters, the operating parameters including fuel injection timing, spark timing, opening and closing timings of intake and exhaust valves of the internal combustion engine.

30. (Once Amended) An exhaust gas purifying system comprising:

a NOx treating catalyst for reducing NOx disposed in an exhaust gas passageway of a combustion device, to reduce NOx in presence of reducing components in exhaust gas; and

a hydrogen enriching device disposed upstream of said NOx treating catalyst with respect to flow of exhaust gas from the combustion device and arranged to increase a ratio of hydrogen to total reducing components in at least one of combustion gas and exhaust gas so as to meet relations represented by following formulae (1) and (2), when reduction of NOx is carried out by said NOx treating catalyst:

$$[H2 / TR]d > [H2 / TR]u \quad ...(1)$$

$$[H2 / TR]d \geq 0.3 \quad ...(2)$$

where [H2 / TR]u is a ratio between a concentration [H2]u of hydrogen and a concentration [TR]u of total reducing components in at least one of exhaust gas in the exhaust gas passageway upstream of said hydrogen enriching device and combustion gas in a state before undergoing the hydrogen ratio increasing by said hydrogen enriching device; and [H2 / TR]d is a ratio between a concentration [H2]d of hydrogen and a concentration [TR]d of total reducing components in exhaust gas in the exhaust gas passageway upstream of the NOx treating catalyst and downstream of said hydrogen enriching device,
wherein said hydrogen enriching device produces hydrogen out of at least one of combustion gas and exhaust gas, wherein the hydrogen enriching device includes at least one selected from the group consisting of a hydrogen producing catalyst containing at least one noble metal, and a combustion control device for controlling at least one selected from the group consisting of operating parameters of an internal combustion engine and combinations of the operating parameters, the operating parameters including fuel injection timing, spark timing, opening and closing timings of intake and exhaust valves of the internal combustion engine.

33. (Once Amended) An exhaust gas purifying system comprising:

a NOx treating catalyst for reducing NOx disposed in an exhaust gas passageway of a combustion device, to reduce NOx in presence of reducing components in exhaust gas; and

a hydrogen enriching device disposed upstream of said NOx treating catalyst with respect to flow of exhaust gas from the combustion device and arranged to increase a ratio of hydrogen to total reducing components in at least one of combustion gas and exhaust gas so as to meet relations represented by following formulae (1) and (2), when reduction of NOx is carried out by said NOx treating catalyst:

$$[H2 / TR]d > [H2 / TR]u \quad ...(1)$$

$$[H2 / TR]d \geq 0.3 \quad ...(2)$$

where [H2 / TR]u is a ratio between a concentration [H2]u of hydrogen and a concentration [TR]u of total reducing components in at least one of exhaust gas in the exhaust gas passageway upstream of said hydrogen enriching device and combustion gas in a state before undergoing the hydrogen ratio increasing by said hydrogen enriching device; and [H2 / TR]d is a ratio between a concentration [H2]d of hydrogen and a concentration [TR]d of total reducing components in exhaust gas in the exhaust gas passageway upstream of the NOx treating catalyst and downstream of said hydrogen enriching device,

wherein the hydrogen [producing catalyst] enriching device produces hydrogen from HC and CO in at least one of combustion gas and exhaust gas, wherein the hydrogen enriching device for enriching hydrogen in at least one of combustion gas and exhaust gas includes at least one selected from the group consisting of a hydrogen producing catalyst containing at least one noble metal, and a combustion control device for controlling at least one selected from the group consisting of operating parameters of an internal combustion engine and combinations of the operating parameters, the operating parameters including fuel injection timing, spark timing, opening and closing timings of intake and exhaust valves of the internal combustion engine.

34. (Once Amended) An exhaust gas purifying system as claimed in claim 33, wherein the hydrogen [producing catalyst] enriching device includes a first catalytic component for oxidizing HC and CO to decrease oxygen, said first catalytic component being disposed in a first section of the hydrogen [producing catalyst] enriching device, and a second catalytic component for producing hydrogen and disposed in a second section of the hydrogen [producing catalyst] enriching device, the second section being located downstream of the first section with respect to flow of exhaust gas, so that an amount of oxygen contacting the second catalytic component is decreased.

35. (Once Amended) An exhaust gas purifying system comprising:

a NOx treating catalyst for reducing NOx disposed in an exhaust gas passageway of a combustion device, to reduce NOx in presence of reducing components in exhaust gas; and

a hydrogen enriching device disposed upstream of said NOx treating catalyst with respect to flow of exhaust gas from the combustion device and arranged to increase a ratio of hydrogen to total reducing components in at least one of combustion gas and exhaust gas so as to meet relations represented by following formulae (1) and (2), when reduction of NOx is carried out by said NOx treating catalyst:

$$[H2 / TR]d > [H2 / TR]u \quad ...(1)$$

$$[H2 / TR]d \geq 0.3 \quad ...(2)$$

where [H2 / TR]u is a ratio between a concentration [H2]u of hydrogen and a concentration [TR]u of total reducing components in at least one of exhaust gas in the exhaust gas passageway upstream of said hydrogen enriching device and combustion gas in a state before undergoing the hydrogen ratio increasing by said hydrogen enriching device; and [H2 / TR]d is a ratio between a concentration [H2]d of hydrogen and a concentration [TR]d of total reducing components in exhaust gas in the exhaust gas passageway upstream of the NOx treating catalyst and downstream of said hydrogen enriching device, and wherein both the NOx treating catalyst and the hydrogen enriching device are disposed in the exhaust passageway and wherein exhaust gas passes through the hydrogen enriching device, wherein the hydrogen enriching device includes at least one selected from the group consisting of a hydrogen producing catalyst containing at least one noble metal, and a combustion control device for controlling at least one selected from the group consisting of operating parameters of an internal combustion engine and combinations of the operating parameters, the operating parameters including fuel injection timing, spark timing, opening and closing timings of intake and exhaust valves of the internal combustion engine.